

WHAT IS CLAIMED IS:

1. A system for communicating information between a power tool and an independent subsystem using a power cord of the tool as a signal conducting medium, the system comprising:

an independent interface subsystem adapted to be electrically coupled to said power cord for bi-directional communication with said power tool via said power cord, and to provide an input signal to said power tool to initiate communication with said power tool;

an electronic module disposed within said tool for storing operational information relating to said power tool;

a controller disposed within said tool and in communication with said electronic module, said controller is adapted to:

recognize said input signal and thereafter enter a communications mode of operation;

obtain said operational information from said electronic module;

and

transmit periodic pulses representative of said operational information over said power cord in synchronization with said input signal;

and

wherein said interface system decodes said periodic pulses to obtain said operational information.

2. The system of Claim 1, wherein:

said periodic pulses comprise current pulses; and

wherein said independent interface subsystem comprises a current reading subsystem for reading said periodic pulses and demodulating said periodic pulses.

3. The system of Claim 1, wherein said interface subsystem comprises a computing device.

4. The system of Claim 1, wherein said input signal comprises an AC input signal having a frequency of approximately 100 - 300 Hz.

5. The system of Claim 4, wherein said periodic pulses comprise pulses that are synchronized in frequency with said AC input signal.

6. The system of Claim 5, wherein said periodic pulses are synchronized with positive going portions of said AC input signal.

7. The system of Claim 1, wherein said periodic pulses comprise a DC input signal.

8. The system of Claim 1, wherein said periodic pulses are capacitively coupled onto said AC input signal.

9. The system of Claim 1, wherein said interface system is further adapted to transmit a data signal to said controller, the data signal representative of data to be stored in said electronic module.

10. The system of Claim 9, wherein said controller further adapted to interpret the data signal and store the data in said electronic module.

11. A system for communicating information between a power tool having a power cord, an internal motor, a switch in communication with said power cord for switching on and off said motor, and a storage module for storing operational information relating to said tool, the system comprising:

an independent interface subsystem adapted to be electrically coupled to said power cord for facilitating bi-directional communications with said power tool, via said power cord;

said independent interface subsystem operating to initiate a communications mode between said power tool and said interface subsystem by applying to the power cord an AC input signal having a frequency greater than 60 Hz and being of insufficient magnitude to cause rotation of said motor; and

a controller disposed within said tool for recognizing said AC input signal and transmitting signal pulses, via said switch, corresponding to said stored operational information over said power cord back to said interface subsystem for decoding by said interface subsystem.

12. The system of Claim 11, wherein said signal pulses are transmitted in synchronization with said AC input signal.

13. The system of Claim 11, wherein said signal pulses are capacitively coupled onto said AC input signal.

14. The system of Claim 11, wherein said signal pulses are DC pulses transmitted in synchronization with said AC input signal.

15. The system of Claim 12, wherein said signal pulses are transmitted during predetermined portions of said AC input signal.

16. The system of Claim 11, wherein said interface system is further adapted to transmit a data signal to said controller, the data signal representative of data to be stored in said electronic module.

17. The system of Claim 16, wherein said controller is further adapted to interpret the data signal and store the data in said electronic module.

18. A method for bidirectionally communicating information to and from a power tool having an internally disposed storage module and controller, said method comprising:

a) applying an input signal from a subsystem independent of said power tool through a power cord of said tool, said input signal informing said controller to enter a communications mode of operation;

b) causing said input signal to have a frequency higher than 60 Hz and a power that is insufficient to cause normal operation of said tool;

c) using said controller to receive said input signal and to initiate downloading of stored information from said module over said power cord via signal pulses generated in synchronization with said input signal; and

d) demodulating said signal pulses to obtain said stored information.

19. The method of Claim 18, wherein using said controller to receive said input signal and to initiate downloading of stored information comprises causing said controller to generate pulses that are synchronized in frequency with said input signal.

20. The method of Claim 19, wherein causing said input signal to have a frequency higher than 60 Hz comprises causing said input signal to form an AC input signal; and

using said controller to receive said input signal and to initiate downloading of stored information comprises causing said controller to generate pulses that are applied during positive portions of said input signal,

wherein said interface system decodes said periodic pulses to obtain said operational information.

21. The method of Claim 18, wherein using said controller to receive said input signal and to initiate downloading of stored information comprises using the controller to control a switch disposed within said tool to generate said signal pulses.

22. A system for fully duplexed bi-directional communication with a power tool, said system comprising:

an electronic component disposed within the power tool, the electronic component comprising a storage module, a controller in communication with the storage module and an electrical switching device;

an independent interface subsystem adapted to:

be electrically connected to a power cord of the power tool for fully duplexed bi-directional communication with the power tool;

to transmit a square wave, bipolar DC signal to the electronic component,

determine the polarity of the electronic component; and

digitally transmit data to the electronic component by sequentially switching the bipolar square wave, DC signal at a specific frequency using a specific communications protocol and baud rate; and

wherein the electronic component is adapted to interpret the digitally communicated data from the interface system and transmit digital data to the interface subsystem by sequentially controlling the flow of current through the electronic switching device.

23. The system of Claim 22, wherein the interface subsystem is further adapted to switch the bipolar square wave, DC signal at approximately 100 Hz using an RS232 communications protocol to thereby digitally transmit data from the interface subsystem.

24. The system of Claim 22, wherein the interface subsystem is further adapted to generate a two character transmission during two of a plurality of communication periods of the bipolar square wave, DC signal to determine the polarity of the electronic component.

25. The system of Claim 22, wherein the controller is further adapted to sequentially operate the electronic switching device to control the current therethrough and transmit the digital data to the interface subsystem.

26 The system of Claim 25, wherein the controller is further adapted to transmit a digital '1' to the interface subsystem by maintaining the switching device in an open position during one of a plurality of conduction periods of the square wave, bipolar DC signal.

27. The system of Claim 25, wherein the controller is further adapted to transmit a digital '0' to the interface subsystem by closing the switching device during one of the conduction periods of the square wave, bipolar DC signal.

28 The system of Claim 22, wherein the electronic component is further adapted to store the digitally communicated data in the storage device.

29. The system of Claim 22, wherein the square wave, bipolar DC signal has a peak-to-peak amplitude sufficient to sustain operation of the electronic component and insufficient to cause a motor of the power tool to rotate during communication with the interface subsystem.

30. The system of Claim 29, wherein the square wave, bipolar DC signal has a peak-to-peak amplitude of approximately plus and minus 96 Volts.

31. The system of Claim 29, wherein the square wave, bipolar DC signal has a peak-to-peak amplitude of approximately plus and minus 192 Volts.

32. The system of Claim 22, wherein the interface subsystem is further adapted to initiate communication with the electronic component by providing power to the electronic component sufficient for the electronic component to operate and insufficient for the tool to operate, thereby.

33. The system of Claim 22, wherein the interface subsystem includes an AC bypass component adapted to allow power input to the interface subsystem to bypass communications circuitry within the interface subsystem and thereby provide power to the power tool sufficient for the tool to operate.

34. The system of Claim 22, wherein the specific communications protocol is adapted to reduce corruption of the data stored in the storage module.

35. The system of Claim 34, wherein the specific communications protocol is further adapted to require a specific sequence of characters having a specific timing be sent by the interface subsystem to the electronic component in order for communication between the interface subsystem and the electronic component to occur.



36. A method for bidirectionally communicating with a power tool, said method comprising:

disposing an electronic component within the power tool, the electronic component including a storage module and a controller in communication with the storage module and an electrical switching device;

electrically connect an independent interface subsystem to a power cord of the power tool to implement fully duplexed bi-directional communication with the power tool;

transmitting a square wave, bipolar DC signal from the interface subsystem to the electronic component;

determining the polarity of the electronic component utilizing the interface subsystem;

digitally transmitting data from the interface subsystem to the electronic component by sequentially switching the bipolar square wave, DC signal at a specific frequency using a specific communications protocol and baud rate;

interpreting the digitally communicated data from the interface system utilizing the electronic component; and

transmitting digital data from the electronic component to the interface subsystem by sequentially controlling the flow of current through the electronic switching device.

37. The method of Claim 36, wherein digitally transmitting data from the interface subsystem comprises sequentially switching the bipolar square wave, DC signal at approximately 100 Hz using an RS232 communications protocol.

38. The method of Claim 36, wherein determining the polarity of the electronic component comprises generating a two character transmission during two of a plurality of communication periods of the bipolar square wave, DC signal.

39. The method of Claim 36, wherein transmitting the digital data to the interface subsystem comprises sequentially operating the electronic switching device to control the current therethrough.

40. The method of Claim 39, wherein sequentially operating the electronic switching device comprises maintaining the switching device in an open position during one of a plurality of conduction periods of the square wave, bipolar DC signal to transmit a digital '1' to the interface subsystem.

41. The method of Claim 39, wherein sequentially operating the electronic switching device comprises closing the switching device during one of the conduction periods of the square wave, bipolar DC signal to transmit a digital '0' to the interface subsystem.

42. The method of Claim 36, wherein the method further comprises storing the digitally communicated data in the storage device.

43. The method of Claim 36, wherein transmitting a square wave, bipolar DC signal comprises transmitting the square wave, bipolar DC signal having a peak-to-peak amplitude sufficient to sustain operation of the electronic component and insufficient to cause a motor of the power tool to rotate during communication with the interface subsystem.

44. The method of Claim 43, wherein transmitting a square wave, bipolar DC signal comprises transmitting the square wave, bipolar DC signal having a peak-to-peak amplitude of approximately plus and minus 96 Volts.

45. The method of Claim 43, wherein transmitting a square wave, bipolar DC signal comprises transmitting the square wave, bipolar DC signal having a peak-to-peak amplitude of approximately plus and minus 192 Volts.

46. The method of Claim 36, wherein the method further comprises initiating communication with the electronic component by utilizing the interface subsystem to provide power to the electronic component sufficient for the electronic component to operate and insufficient for the tool to operate.

47. The method of Claim 36, wherein the method further comprises allowing power input to the interface subsystem to bypass communications circuitry within the interface subsystem and thereby provide power to the power tool sufficient for the tool to operate.

48. The method of Claim 36, wherein digitally transmitting data comprises requiring a specific sequence of characters having a specific timing be sent by the interface subsystem to the electronic component in order for communication between the interface subsystem and the electronic component to occur, thereby reducing corruption of the data stored in the storage module.